



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,928	02/23/2004	Shin-ichi Uehara	Q79936	7682

23373 7590 08/29/2005

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
----------	--------------

2872

DATE MAILED: 08/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/782,928

Applicant(s)

UEHARA ET AL.

Examiner

Audrey Y. Chang

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on June 23, 2005, which has been entered into the file.
- By this amendment, the applicant has amended claims 1-2, 5-6, 7, 14, 18-19, and 22-23. Claims 1-24 remain pending in this application.

Drawings

1. The drawings were received on June 23, 2005. These drawings are NOT accepted. Since "X" and "Y" are being claimed in related to " $\tan(l')$ " and "D" such relationship needed to be explicitly illustrated.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the symbols "X", "Y" and " $\tan(l')$ " recited in various claims must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be

Art Unit: 2872

notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to because reference character “D” has been used to designate both *distance from the most distant point* to the display panel and *distance from midpoint* to the display panel, as recited in **claims 1 and 14** respectively. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claims 1 and 14 have been amended to indicate the distance (D) in the normal direction between the display panel and a viewer’s midpoint, however this distance is being designed as “OD” in the Figures. Please clarify the confusions.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. **Claims 4-5, 9-10, 17-18 and 22-23 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification and the claims fail to teach how could the optical unit, either of a parallax barrier having a plurality of slits or of a lenticular lens having a plurality of cylindrical lenses, arranged for each **row** of the pixel sections and extended along an extending direction of the **row** is capable of providing three-dimensional image display. It is implicitly true that the either the slits or the cylindrical lens arranged along the extended direction of a row will have *vertical* lens function, (with respect to a viewer), that forms *horizontal* image line which then cannot be able to provide stereoscopic image view. Furthermore, the specification and the figures **only** give **support** for the slits or the cylindrical lenses to have *horizontal lens function*, which forms vertical image line at different **horizontal locations** to define the viewing region, (please see Figures 1-11). It is obvious that the **two eyes** are located on *horizontal line* not vertical line. No disclosure of the slits or lenticular lenses being arranged along the row of the pixels can be found in the specification and the Figures.

Applicant's arguments fails to clarify such confusions. Perhaps the clarification as to **what exactly** is "extended along an extending direction of the row", is needed to be made explicitly in the claims in order to make the device operable. A parallax barrier comprises of a plurality of slits, that are generally of a *rectangular opening* (or a two-dimensional opening), so the opening generally has "extend" in both horizontal (or row direction) as well as vertical direction. Usually when the word "extend" is used it means the extension of the opening in the *longer dimension* which in this case will be vertical direction. A lenticular lens array as shown in Figures 1 and 2, has cylindrical lens *extended* in vertical direction and lens *periodically arranged* in horizontal direction (or row direction as of the row arrangement of the

Art Unit: 2872

display panel) so that the lens function in the vertical direction can focus the image light from the display panel a shown in Figure 2.

Claim Objections

6. Claims 1-24 are objected to because of the following informalities:

(1). Claims 1, 2, 6, 14, and 19, have been amended to include the phrase “in at least one array direction out of the *perpendicular* array directions of said pixel sections” is really confusing and indefinite since it is really not clear what is considered to be “array direction” and what is considered to be “*perpendicular* array directions”. Perpendicular with respect to what? Also what exactly is considered to be an “array direction”? The phrase “at least one array direction out the array directions of said pixels sections” objected in the previous Office Action is still presented in claims 15 and 20.

(3). The symbol “ $\tan(1')$ ” recited in various claims is confusing and indefinite since the claims fail to give a definition and *physical meanings* for such symbol. The meaning needed to be *explicitly* stated in the claims to make the scopes of the claims clear.

(4). The **amended** phrase “a distance in the normal direction from a point of said display panel to a viewer’s midpoint is ... by positioning a midpoint between a viewer’s right eye and left eye in a normal direction from said display panel within said three dimensional visible range” recited in **claim 1** is very descriptive and it is not clear how does this phrase relate to the *next paragraph* concerning the “distance D”.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2872

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 3, 6, 8, 11-14, 16, 19, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Momochi (PN. 5,528,420).

Momochi teaches a *method* and *apparatus* for outputting image for stereoscopic vision wherein the apparatus comprises a display panel having a *plurality of pixels* forming pixel sections wherein the plurality of pixels displaying image for the right eye and image for the left eye respectively, and the pixels has a *matrix* form, (please see Figures 4 and 5). The apparatus further comprises an *optical unit*, such as a *lenticular lens*, for re-emitting image light from the display panel to *right eye and left eye of an observer*, respectively, (please see Figures 6-8). It is implicitly true that the optical unit will establish a three-dimensional visible *range*, which correspond to a three dimensional region that the left eye of the observer will *only* see the left eye image and the right eye of the observer will *only* see the right eye image. And it is implicitly true that there is a definite distance (D'), in the *normal direction* with respect to the display panel, between the *most* distant point in the three-dimensional visible range and the display panel and there is a definite distance (D''), in the normal direction with respect to the display panel, between the *midpoint* of the two eyes of the observer and the display panel.

With respect to the amendments to claims 1, concerning the positioning of the midpoint between the two eyes of the observer within the three dimensional visible range, it is implicitly true that as long as the midpoint of the two eyes of the observer is positioned with a *normal distance* to the display panel in the range of D' to D'' , three-dimensional image view will be observed by the observer.

As demonstrated by the Figure 7, the distance D'' , measured from the midpoint of the two eyes to the display panel, should equal to D (observation distance) *plus* ($n*f$). The symbol “ n ” means refractive index of the lenticular lens and “ f ” means the focal length of the lens. The *smallest* separation between

Art Unit: 2872

two adjacent image pixel sections that can be *resolved* by the eyes so that one image from the first pixel section to be directed to left eye and the other image from the adjacent second pixel section to the right eye is indicated in Figure 7 as Δ . And the definition of the pixel section is defined as $1/\Delta$. From simple geometry one can calculate the definition of the pixel section as the following:

Assuming the *angular separation* between the image lights from the two adjacent pixel sections is a and the angular separation of the image light after passing through the optical unit or lenticular lens is b . Then the following condition can be established:

$\Delta/n*f = \tan(a)$ and $W/D = \tan(b)$. W being the separation distance between two eyes and D is the observation distance.

The actual distance between the midpoint of the two eyes and the display panel (D'') and the actual distance between the most distant point in the three dimensional visible range and the display panel (D') are defined as follows:

$$D'' = D + n*f \text{ and } D' > D''.$$

One can then get the following conditions:

$\Delta + W = (n*f) \tan(a) + D \tan(b)$, for paraxial light, $b = n*a$, and $\tan(a)$ approximately equals to a in radians and $\tan(b)$ approximately equals to b in radians. And if the optical unit is a *parallax barrier* with slits instead of the lenticular lens, the angle a will be equal to angle b . This means the following:

$\Delta + W$ approximately equals $(n*f + D) * \tan(a)$, which then equals to $D'' * \tan(a)$. This means $\Delta < D'' * \tan(a)$, or $1/\Delta > 1/(D'' * \tan(a))$, with the conversion factor between millimeter to inch (i.e. 25.4 millimeter per inch), $1/\Delta > 25.4/(D'' * \tan(a))$ (dpi). Similarly $\Delta < D' * \tan(a)$, (i.e. distance measured from display panel to the most distant point in the visible range).

This means $1/\Delta > 25.4/(DIS * \tan(a))$ (dpi). By setting the distance in the normal direction of the observer to the display panel to be **DIS, wherein DIS is between D' and D''** . The **definition** of the pixel section ($1/\Delta$) therefore is defined with respect to the angular separation of the image light from the

Art Unit: 2872

adjacent pixel section. This reference however does not teach the angular separation to be one minute. However it is known in the art that a general eyesight is 1.0, which means the minimum angular separation, is $1/60$ degree or one minute. This means the **definition is $1/\Delta > 25.4/(D \cdot \tan(1'))$ (dpi).**

With regard to claims 6, and 19, Momochi teaches that for Δ assumes values of 0.05 mm, the definition is therefore about 500 dpi, (please see column 10). For observation distance greater than 250 mm from the display panel, the definition of the pixel section is 350 dpi. Although this reference does not teach explicitly that the observation distance is 500 mm, however this observation distance is standard distance in most of the display apparatus, such modification would have been obvious to allow comfortable viewing or observation distance for the observer.

With regard to claims 3, 8, 16 and 21, this reference does not teach explicitly that the display panel is a liquid crystal display device. However liquid crystal display device is commonly used in stereoscopic image display apparatus, such modification would have been obvious to one skilled in the art for the benefit of applying common type of display device to achieve the stereoscopic image display.

With regard to claims 11 and 24, Momochi teaches the image display device is intended for displaying three-dimensional images taken from photographs and being processed by a computer, (please see 3). However it does not specify that it is movie picture. But the application of such display apparatus to display movie pictures would have been obvious to one skilled in the art since it involves only feed in movie pictures to the computer for processing, and such modification has the advantage of displaying three dimensional movie pictures.

With regard to claims 12-13, this reference also does not teach explicitly that the display apparatus is applied to different portable devices. However it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Madham*, 2 USPQ2d 1647 (1987).

9. **Claims 2, 4, 7, 9, 15, 17, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Momochi as applied to claims 1, 6, 14 and 19 above, and further in view of the patent issued to Isono et al (PN. 5,315,377).**

The method and apparatus for outputting image for stereoscopic vision taught by **Momochi** as described for claims 1, 6, 14 and 19 above has met all the limitations of the claims. With regard to claims 2, 7, 15 and 20, this reference does not teach explicitly about the definition of the pixel section in a second direction of the pixels matrix. With regard to claims 4, 9, 17 and 22, this reference also does not teach explicitly that the optical unit can be a parallax barriers with a plurality of slits. **Isono et al** in the same field of endeavor teach a three-dimensional image display wherein a *parallax barrier* having a plurality of slits (Figures 2, 4 and 8A), that is aligned with the matrix arrangement of the pixels (Figures 8B and 9) is used to provide the three-dimensional image display. It is implicitly true for square or rectangular type of pixel section, the same definition analysis disclosed above also applies for the second direction of the matrix to allow the image being resolved by the eyes of the observer to achieve stereoscopic viewing. It would then have been obvious to one skilled in the art to apply the teachings of **Isono et al** to modify the display apparatus of **Momochi** to use parallax barrier, an electronic one as disclosed by **Isono et al**, as alternative means to achieve the stereoscopic image display for the benefit of allowing different design and control, (the electronic driven parallax barrier has the advantage of controlling the slit size), that suited for different application to achieve the stereoscopic image viewing.

10. **Claims 5, 10, 18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Momochi as applied to claims 1, 6, 14 and 19 above, and further in view of the patent issued to Chikazawa (PN. 5,852,512).**

The method and apparatus for outputting image for stereoscopic vision taught by **Momochi** as described for claims 1, 6, 14 and 19 above has met all the limitations of the claims. Momochi teaches the optical unit is a *lenticular* lens having a plurality of cylindrical lenses. However it does not teach explicitly that the cylindrical lenses are along the *row* direction of the pixels. However the specification fails to provide the teachings and support for achieving such, it is therefore examined with the broadest interpretation.

Chikazawa in the same field of endeavor teaches a lenticular lens having a plurality of cylindrical lenses that are arranged along the row direction of the pixels. It would then have been obvious to one skilled in the art to modify the arrangement according to Chikazawa for the benefit of providing different arrangement of the pixels for achieving the same stereoscopic image display.

Response to Arguments

11. Applicant's arguments filed June 23, 2005 have been fully considered but they are not persuasive.
12. In response to applicant's arguments which state that the examiner has read the "picture element pitch" of cited Momochi reference being equivalent to the "definition" in applicant's claims since applicant claims the *definition* being a *function of distance D* in the normal direction from the display panel to the viewer and therefore differs from the instant application, the examiner respectfully disagrees for the reasons stated below. Firstly, a definition, (since the application fails to give other more specified definition of the term "definition") is understood in the art as the maximum resolution a human eye can resolve with regard to the minimum separation that a display unit such as dots or pixel can have in a display, this certainly then is equivalent to "pixel pitch" since a pixel pitch does give the minimum separation between pixels. Secondly, the **explicit derivation** of the "definition" as stated in the **paragraph above** from the teachings of Momochi *is derived* from the consideration of the *resolution*

Art Unit: 2872

limitation of a human being (incidentally the minimum angular separation or resolution of a human eye of one minute (or 1/60 a degree) is *inherent* in the human eye design) having his or her eyes distant in a normal direction (DIS) from the display panel, this means the definition taught in Momochi is also a **function of given distance (DIS)** and is in term of the *human limitation of minimum angular resolution of one minute (or 1/60 of a degree)*. Applicant's argument which states that "Momochi specifically discloses and teaches a definition, picture element pitch, which varies incrementally toward the periphery of the display panel for a given distance (D)" is **completely wrong and without basis**. The distance used to calculate the definition is also measured in normal direction between the observer and the display panel, it therefore does not change when consider the periphery of the display panel. Furthermore, if the allegation is true for the cited Momochi reference it will also be true for the instant application.

13. In response to applicant's arguments concerning the features of the definition being 175(dpi) or greater for a viewing distance of about 500mm, it is implicitly true by the definition calculated from the teachings of Momochi, the definition will be greater than 175(dpi) when plug in the distance with a value of 500 mm into the explicit equation for the definition.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2872

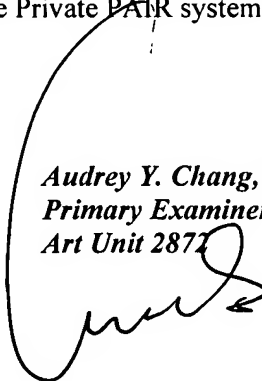
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Audrey Y. Chang, Ph.D.
Primary Examiner
Art Unit 2872*



A. Chang, Ph.D.